

Cal/Ecotox
Exposure Factors for Loggerhead Shrike (Lanius ludovicianus)\*

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Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Age at Fledging, Metamorphosis, Weaning			15.6-15.8	d	NR	Fledgling	FL	a	1
Age at Fledging, Metamorphosis, Weaning	17			d	NR	Fledgling	CO	b	2
Age at Fledging, Metamorphosis, Weaning			14-19	d	NR	Fledgling	ID	c	3
Age at Fledging, Metamorphosis, Weaning	16.8			d	NR	Fledgling	OK	d	4
Age at Fledging, Metamorphosis, Weaning			14-16	d	NR	Fledgling	CANADA	e	5
Age at Sexual Maturity	1			yr	NR	Adult	ID	f	6
Body Weight - Mean	33.0	2.6 SD	28.5-37.1	g	NR	Nestling	FL	g	7
Clutch or Litter Size	3.8	0.8 SD	2-5	eggs/clutch	F	Adult	FL	h	1
Clutch or Litter Size	5.3	0.6 SD		eggs/clutch	F	Adult	SC	i	8
Clutch or Litter Size			5-7	eggs/clutch	F	Adult	Santa Clara; CA	j	9
Clutch or Litter Size	6.39		5-8	eggs/clutch	F	Adult	CO	k	2
Clutch or Litter Size	6.1	0.8 SD		eggs/clutch	F	Adult	ID	l	3
Clutch or Litter Size	5.8		5.6-5.9	eggs/clutch	F	Adult	OK	m	4
Clutch or Litter Size	5.65	1.17 SD	3-7	eggs/clutch	F	Adult	MN	n	10
Clutch or Litter Size			4.91-5.56	eggs/clutch	F	Adult	CANADA	o	5
Clutch or Litter Size	3.8	0.9 SD		eggs/clutch	F	Adult	FL	p	7
Clutches or Litters per year			1-2	clutches/yr	B	Adult	FL	q	1
Clutches or Litters per year			1-2	clutches/yr	B	Adult	SC	r	8
Clutches or Litters per year	1			clutches/yr	B	Adult	CO	s	2
Clutches or Litters per year			1-2	clutches/yr	B	Adult	OK	t	4
Clutches or Litters per year			1-2	clutches/yr	B	Adult	MN	u	10
Clutches or Litters per year			1-2	clutches/yr	B	Adult	CANADA	v	5
Clutches or Litters per year			1-2	clutches/pair	B	Adult	FL	w	7
Dietary Composition	Odonata (12.1), Hemiptera (23.0), Coleoptera (22.3), Lepidoptera (7.3), Orthoptera (16.8), Hyla cinerea (7.6), H. squirella (1.7), Gastrophys carolensis (0.9), Rana spenocephala (0.4), Anolis carolinensis (2.8), Scincella lateralis (4.1), Eumeces inexpectatus (1.0)			%	B	Adult	FL	x	11
Dietary Composition	Orthoptera (59); Lepidoptera (15); Coleoptera (10); arthropod larvae (8); mammals; reptiles and amphibians (4); unident. arthropods (3)			%	NR	Nestling	SC	y	12
Dietary Composition	Mollusca (0.00), Crustacea (0.27), Arachnida (0.14), Insecta (14.77), Reptilia (53.29), Mammalia (27.66), Aves (3.86)			%	NR	NR	CA	z	13
Duration of Incubation or Gestation	16.9		16.6-17.1	d	B	Embryo	OK	aa	4
Duration of Incubation or Gestation			14.7-15.1	d	NR	Embryo	FL	ab	1
Duration of Incubation or Gestation	16			d	NR	Embryo	CO	ac	2
Duration of Incubation or Gestation	17		15-20	d	NR	Embryo	CANADA	ad	5
Fledging or Weaning Rate	1.4	1.7 SD		fledglings/nest	NR	Fledgling	FL	ae	1

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Fledging or Weaning Rate	4.7	1.3 SD	4.36-5.88	fledglings/n est	NR	Fledgling	SC	af	8
Fledging or Weaning Rate	5.40			fledglings/n est	NR	Fledgling	CO	ag	2
Fledging or Weaning Rate	5.1	1.5 SD		fledglings/p air	NR	Fledgling	ID	ah	3
Fledging or Weaning Rate	60		46-83	%	NR	Fledgling	OK	ai	4
Fledging or Weaning Rate	3.02	2.07 SD	3.90-4.17	fledglings/n est	NR	Fledgling	MN	aj	10
Fledging or Weaning Rate				fledglings/n est	NR	Fledgling	CANADA	ak	5
Fledging or Weaning Rate	1.1			fledglings/n est	NR	Fledgling	FL	al	7
Fledging or Weaning Rate	2.33	0.34 SD		fledglings/n est	NR	Fledgling	CA	am	14
Foraging Distance	9.2			m	NR	Adult	FL	an	15
Foraging Distance	6.5			m	NR	Adult	FL	ao	15
Hatching Success	1.8	2.0 SD		hatchlings/ nest	NR	Hatchling	FL	ap	1
Hatching Success	4.4	1.8 SD		hatchlings/ nest	NR	Hatchling	SC	aq	8
Hatching Success	5.69			eggs/nest	NR	Hatchling	CO	ar	2
Hatching Success	84		5.07-6.26 69-95	%	NR	Hatchling	OK	as	4
Hatching Success	4.18	2.33 SD	4.20-5.42	hatchlings/ nest	NR	Hatchling	MN	at	10
Hatching Success				hatchlings/ nest	NR	Hatchling	CANADA	au	5
Hatching Success	33.8	47.6 SD		%	NR	Hatchling	FL	av	7
Longevity	3		1 pair/8.9 ha to 1 pair/25 ha	yr	F	Adult	CA	aw	14
Longevity	12-6			yr-mo	NR	Adult	OK	ax	16
Population Density					B	Adult	ID	ay	6
Population Density			1/4.3 to 1/11.6	pairs/km	B	Adult	CA	az	14
Population Density	90-96			individuals/ 12 study blocks	NR	Adult	CANADA	ba	17
Survival/ Mortality	0.47				B	Adult	MN	bb	10
Survival/ Mortality	13.0	0.2 SD		%	NR	Embryo	FL	bc	1
Survival/ Mortality	64.0	30.1 SD		%	NR	Embryo	FL	bd	1
Survival/ Mortality	46		29-100	%	NR	Fledgling	OK	be	4
Survival/ Mortality	45			%	NR	Fledgling	CA	bf	14
Survival/ Mortality				%	NR	Juvenile	WA	bg	18
Survival/ Mortality	67.0	1.8 SD		%	NR	Nestling	FL	bh	1
Survival/ Mortality	73.0	28.8 SD		%	NR	Nestling	FL	bi	1
Survival/ Mortality	64			%	NR	Nestling	OK	bj	4
Territory Size	9.3	3.8 SD	5.3-9.6	ha	B	Adult	FL	bk	7
Territory Size	8.35	0.66 SD		ha	B	Adult	FL	bl	11

Endpoint Type	Endpoint Value	Error	Range	Units	Sex	Life Stage	Location	Note	Reference
Territory Size	34	12 SD		ha	B	Adult	CA	bm	14
Territory Size			0.17-14.59	ha	NR	Adult	FL	bn	15
Time of Mating/ Laying	Apr-mid Aug				B	Adult	ID	bo	3
Time of Mating/ Laying	late Feb (begin), April (peak)				B	Adult	OK	bp	4
Time of Mating/ Laying	late Feb-early Apr				F	Adult	Santa Clara; CA	bq	9

Notes

- a range of average nestling periods, in two habitats, for successful nests; N=64 clutches; Archbold Biological Station
- b normal fledging period; N=232 fledged birds; Pawnee National Grassland
- c age at which young left nests; N=65 pairs; Ada, Elmore, Owyhee Counties; Newly fledged young were often still incapable of flight.
- d N=28 nests; Lawton, Comanche County
- e N=27-52 pairs/yr; eastern Ontario, Quebec
- f N=4 birds; Ada, Elmore, Owyhee Counties; Birds bred successfully at approximately 1 year of age.
- g mean body weight of 10 day old nestlings; N=18 nestlings; Archbold Biological Station, Highlands County
- h average clutch size; N=64 clutches; Archbold Biological Station
- i mean clutch size, 2 years; N=20 nests; York County
- j N=9 clutches; Dataset includes second, third and fourth clutches laid within a season (due to egg removal).
- k average clutch size, 4 years; N=77 pairs; Pawnee National Grassland
- l average number of eggs per clutch, 2 years; N=84 clutches; Ada, Elmore, Owyhee Counties
- m average clutch size, 4 years; N=101 nests; Lawton, Comanche County
- n average clutch size, 2 years; N=46 clutches; southern Minnesota
- o average clutch sizes, 2 years; N=27-52 pairs/yr; eastern Ontario, Quebec
- p mean clutch size; N=24 clutches; Archbold Biological Station, Highlands County
- q number of second clutches laid per season; N=27 pairs; Archbold Biological Station; Twenty three percent of pairs laid second clutches after successfully raising first brood.
- r N=49 nests; York County; 8.2% of nests found were second nests following initial successful nests.
- s N=77 pairs; Pawnee National Grassland; No occurrence of double brooding reported.
- t N=122 pairs; Lawton, Comanche County; 19.1% of pairs attempted second broods.
- u N=48 pairs; southern Minnesota; 10% of pairs attempted second broods.
- v N=27-52 pairs/yr; eastern Ontario, Quebec; Double brooding was rarely observed.
- w number of clutches laid per season per pair; N=10 pairs; Archbold Biological Station, Highlands County
- x percent of total prey items caught by observed pairs; N=6 territories; Archbold Biological Station near Lake Placid; No differences observed in diet composition after pasture was mown.
- y percent of total identified prey items delivered to the nest; N=1 pair, 155 identified prey; Apr, May; York County; 17% of all delivered prey items were identified during observations.
- z percent of total prey found in pellets by biomass; N=1238 pellets; San Clemente Island; See citation for more detailed taxonomic analysis and energetic values of prey items.
- aa average incubation period, 4 years; N=55 nests; Lawton, Comanche County
- ab range of average incubation periods, in two habitats, for successful nests; N=64 clutches; Archbold Biological Station
- ac incubation period; N=330 hatched eggs; Pawnee National Grassland
- ad average incubation period, 2 years; N=27-52 pairs/yr; eastern Ontario, Quebec
- ae average number of fledglings produced per nest; N=64 clutches, 245 eggs; Archbold Biological Station; 37% percent of eggs laid survived to fledging.
- af average number of fledglings produced per successful nest, 2 years; N=32 nests; York County; Overall fledging success was 88.3%.
- ag average number of fledglings produced per nest; N=65 successful nests; Pawnee National Grassland; 66.2% of all observed nests fledged at least one young.
- ah average number of fledglings per successful pair; N=65 pairs; Ada, Elmore, Owyhee Counties
- ai average percent of nests that fledged at least 1 young, 4 years; N=133 pairs; Lawton, Comanche County
- aj average number of fledglings produced per nesting attempt; N=60 nesting attempts; southern Minnesota; 83% of pairs successfully fledged at least one young.
- ak average number of young surviving to fledge per nest, 2 years; N=27-52 pairs/yr; eastern Ontario, Quebec; 2.3 to 2.5 fledglings per nest survived to independence.
- al mean number of fledglings produced per nesting attempt; N=24 clutches; Archbold Biological Station, Highlands County; Mean number of fledglings/pair was 3.1 (2.9 SD) in experimental areas with increased # of perch sites.
- am mean number of fledglings produced per successful nest; N=29 nests; San Clemente Island
- an maximum distance travelled from a cabbage palm to a prey item on ground; N=21 territories; Jun-Aug; Archbold Biological Station, Lake Placid
- ao maximum distance travelled from a fence post to a prey item on ground; N=21 territories; Jun-Aug; Archbold Biological Station, Lake Placid

ap	average number of hatchlings per nest; N= 64 clutches, 245 eggs; Archbold Biological Station; 46% of eggs hatched of those that were laid.
aq	average number of young hatched per nest, 2 years; N=37 nests; York County; Overall hatching success was 94.7%.
ar	average number of eggs hatched per successful nest; N=65 successful nests; Pawnee National Grassland; 79.5% of all eggs hatched.
as	average percent of nests that hatched at least 1 young, 4 years; N=133 pairs; Lawton, Comanche County
at	average number of eggs hatched per nest; N=51 nests; southern Minnesota
au	average number of hatchlings per nest, 2 years; N=27-52 pairs/yr; eastern Ontario, Quebec
av	percent of eggs that produced hatchlings by the day after the first hatch; N=24 clutches; Archbold Biological Station, Highlands County
aw	adult life expectancy based on duration of home range occupancy; N=NR; San Clemente Island
ax	age of oldest identified banded individual; N=NR
ay	range of nesting density, 2 study areas; N=10-19 pairs/study area; Ada, Elmore, Owyhee Counties
az	range in density of pairs, 4 years; N=5-13 pairs/year; San Clemente Island
ba	range of densities over 2 sampling years; N=2 sample years; June-July; southeastern Alberta; Each study block was 6.4 square kilometers.
bb	annual adult survival (based on reoccupancy rate from the previous year), over 3 years; N=16-37 territories/year; southern Minnesota
bc	estimated probability of an egg surviving to hatch in fenceline areas; N=39 clutches; Archbold Biological Station; See citation for daily survival estimates.
bd	estimated probability of an egg surviving to hatch in pasture areas; N=25 clutches; Archbold Biological Station; See citation for daily survival estimates.
be	calculated probability of survival of any nest from incubation onset to end of fledging; N=109 nests; Lawton, Comanche County
bf	percent of fledglings that died before reaching independence from parents; N=29 nests; San Clemente Island
bg	survival rate of juveniles prior to dispersal from the breeding territory; N=36 nests; Yakima Training Center
bh	estimated probability of a nestling surviving to fledge in fenceline areas; N=39 clutches; Archbold Biological Station; See citation for daily survival estimates.
bi	estimated probability of a nestling surviving to fledge in pasture areas; N=25 clutches; Archbold Biological Station; See citation for daily survival estimates.
bj	overall nestling survival rate; N=90 nests; Lawton, Comanche County
bk	N=10 pairs; Archbold Biological Station, Highlands County; Mean territory size was 2.3 ha in experimental areas with increased # of perch sites.
bl	mean territory size in pasture habitat; N=6 territories; Archbold Biological Station near Lake Placid
bm	mean pair foraging area during breeding season, 4 years; N=12 territories; San Clemente Island
bn	range of post-breeding territory size; N=21 territories; Archbold Biological Station, Lake Placid
bo	period from clutch initiations to chicks fledging; N=98 pairs; Ada, Elmoor, Owyhee Counties
bp	time of nesting activity; N=133 pairs; Lawton, Comanche County
bq	period of egg laying; N=1 pair, 4 years

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